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UNITED STATES GOVERNMENT

Memorandum

FORESTRY SCIENCES LABORATORY
PACIFIC NORTHWEST FOREST AND
RANGE EXPERIMENT STATION
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Wickman 1940 ✓

TO : All Concerned[1/]

4500
DATE: July 23, 1968

FROM : Bohdan Maksymiuk, Principal Entomologist

SUBJECT: Part I. Biological evaluation of the Douglas-fir tussock moth egg masses collected in Arizona, 1967.

Part II. Biological evaluation of larvae collected in Arizona in 1968 is in progress and will be reported when completed.

I. GENERAL:

Egg masses were collected near Aztec Peak in Arizona, October 4, 1967 by B. Wickman, R. Mason, B. Maksymiuk, P. Buffam, and H. Flake. Variation of egg masses distribution between plots (using uniform sampling) is shown in Table 1.

Table 1. Number of egg masses collected on different plots

Plot Identity	No. of New Egg Masses
A	2
B	4
C	21
D	13
E	1
F	0
G	2
H	1
I	1
J	0
Total	45

1/ Detailed report will be prepared later. These up-to-date highlights are primarily for the Project 2201 to facilitate seasonal field studies and to inform others on the current status to make decision on the feasibility of operational spray test in Arizona, 1969.

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Egg masses were placed together in separate containers for each plot. They were kept for the first two weeks at 23° C, then stored at 7° C until used for the specific evaluations.

II. OBJECTIVES:

Using representative plot samples, the following was attempted to determine:

1. mean number of eggs per mass and precision of this estimate,
2. percent of larval hatch (using samples from the above sterilized egg masses,
3. incidence of virus (unsterilized egg masses), and
4. effect of egg sterilization on onset and duration of larval hatch.

III. OBJECTIVE NO. 1.--Determination of the mean number of eggs per mass and precision of this estimate.

Material and Methods.--A total of 20 egg masses were taken at random from plots containing more than one egg mass. They were individually sterilized, using standard laboratory procedure (Notebook "Insect Rearing" p. 21) on March 18 and 19. Number of eggs per each mass was counted.

Results.--Results are presented in Table 2.

Table 2. Determination of number of eggs per egg mass

Plot identification and egg mass number	No. of eggs per egg mass
A	248
B-1	216
B-2	357
C-1	299
C-2	273
C-3	225
C-4	252
C-5	213
C-6	311
C-7	321
C-8	248
C-9	267
C-10	253
D-1	251
D-2	244
D-3	223
D-4	229
D-5	290
D-6	247
G	230
Total 20	5,197
Mean	259.85

Standard error of the mean estimate at the 0.05 probability level is $\pm$ 17.93. Mean number of eggs per mass is 260 $\pm$ 18. Spread is 357-213 = 144.

IV. OBJECTIVE NO. 2.--Determination of the percent of larval hatch.

Materials and Methods.--A total of 50 eggs were taken at random from each of the sterilized egg masses from objective No. 1 and exposed for hatch (50 eggs/dish) at room temperature of 25° C and 50% relative humidity. Number of hatched larvae was recorded daily (Fig. 1).

Results.--End results are summarized in Table 3.

Table 3. Percent of larval hatch

Plot identification and egg mass number	No. of eggs exposed for hatch	Hatch	
		No.	%
A	50	27	54
B-1	50	47	94
B-2	50	44	88
C-1	50	44	88
C-2	50	49	98
C-3	50	41	82
C-4	50	46	92
C-5	50	23	46
C-6	50	48	96
C-7	50	46	92
C-8	50	32	64
C-9	50	45	90
C-10	50	46	92
D-1	50	35	70
D-2	50	31	62
D-3	50	47	94
D-4	50	13	26
D-5	50	49	98
D-6	50	47	94
G	50	46	92
Total	1,000	806	
Mean		40.3	80.6

Standard error of the mean estimate of number of hatch at the 0.05 probability level is $\pm$ 4.60. Spread is 49-13 = 36.

Standard error of the mean estimate of percent of hatch at the 0.05 probability level is $\pm$ 4.39. Mean percent hatch per sterilized egg mass is 80.6 $\pm$ 9.2.

V. OBJECTIVE NO. 3.--Incidence of virus (unsterilized egg masses).

Materials and Methods.--A total of 25 egg masses were taken from 8 plots to determine natural incidence of virus. Hatched larvae were reared aseptically on the Douglas-fir tussock moth medium--5 larvae per dish.

Results.--Results are given in Table 4.

Table 4. Virus incidence

Plot Identity	No. of unsterilized egg masses	No. of larvae	No. of dead larvae having virus	Incidence of virus, %
A	1	186	4	2.15
B	2	416	19	4.56
C	11	2,120	134	6.32
D	7	1,538	61	3.96
E	1	195	1	0.51
G	1	313	6	1.91
H	1	207	0	0
I	1	244	8	3.27
Total	25	5,219	233	4.46

Overall estimates of virus incidence (4.46%) might be rather high because larvae were reared 5 per dish instead of one per dish (due to the shortage of help). This can result in cross-infection of larvae. However, food was frequently changed and aseptic measures followed.

VI. OBJECTIVE NO. 4.--Effect of egg sterilization on onset and duration of larval hatch.

Materials and Methods.--For this study, two sets of larvae were used originating from the same egg mass population. First set of larvae were from sterilized egg masses reported under the objective No. 2 (determination of the percent of larval hatch). The second set of larvae were from unsterilized egg masses reported under the objective No. 3 (incidence of virus).

Results.--Results are summarized in the frequency distribution histograms in Fig. 1 and 2. The following was found:

1. Sterilization accelerates onset of larval hatch;

2. Sterilization shortens the range of larval hatch (more uniform hatch); and

3. Percent hatch is not affected by sterilization.

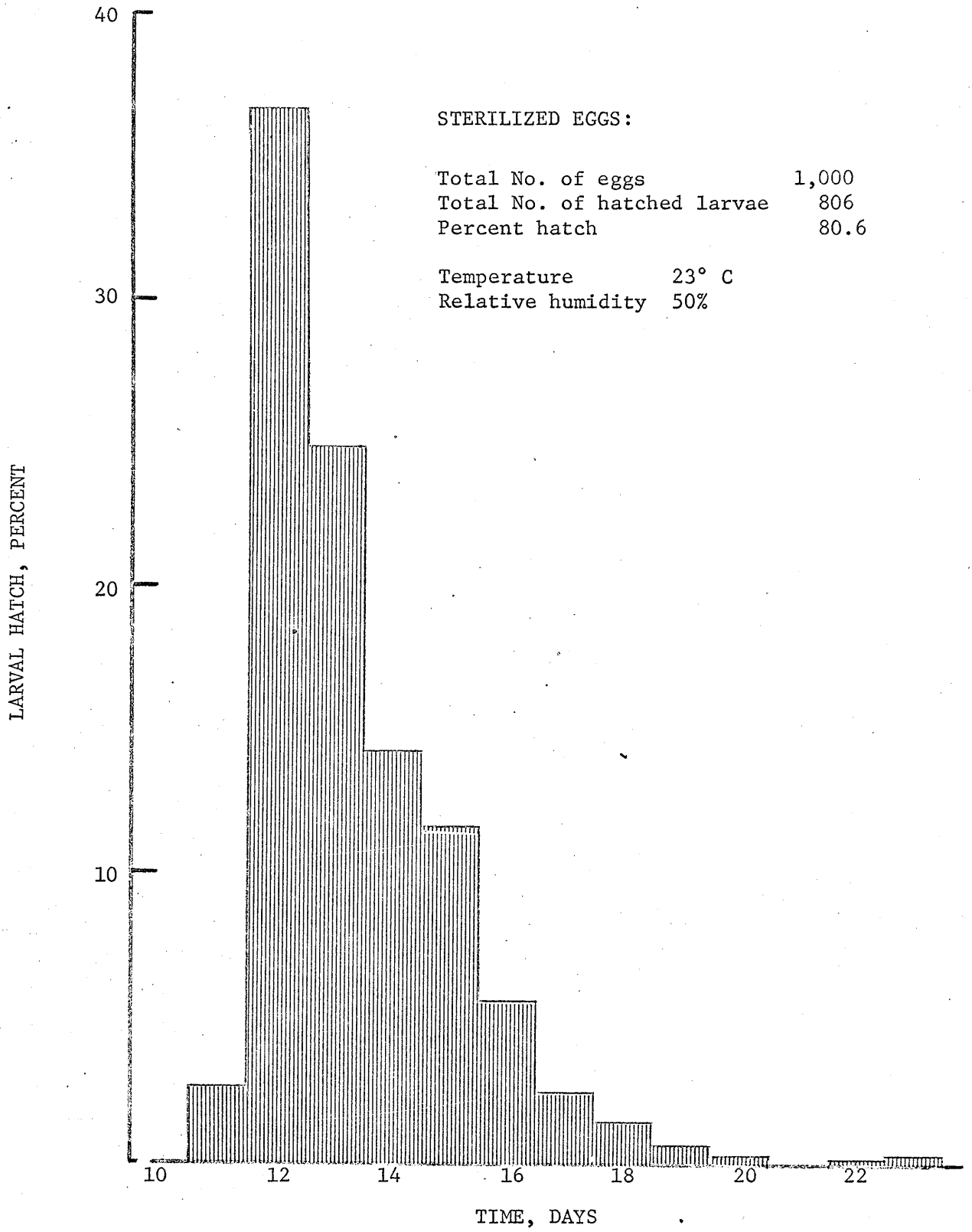

FIG. 1.--Frequency distribution histogram showing percent of larval hatch in days after eggs were exposed for hatching.

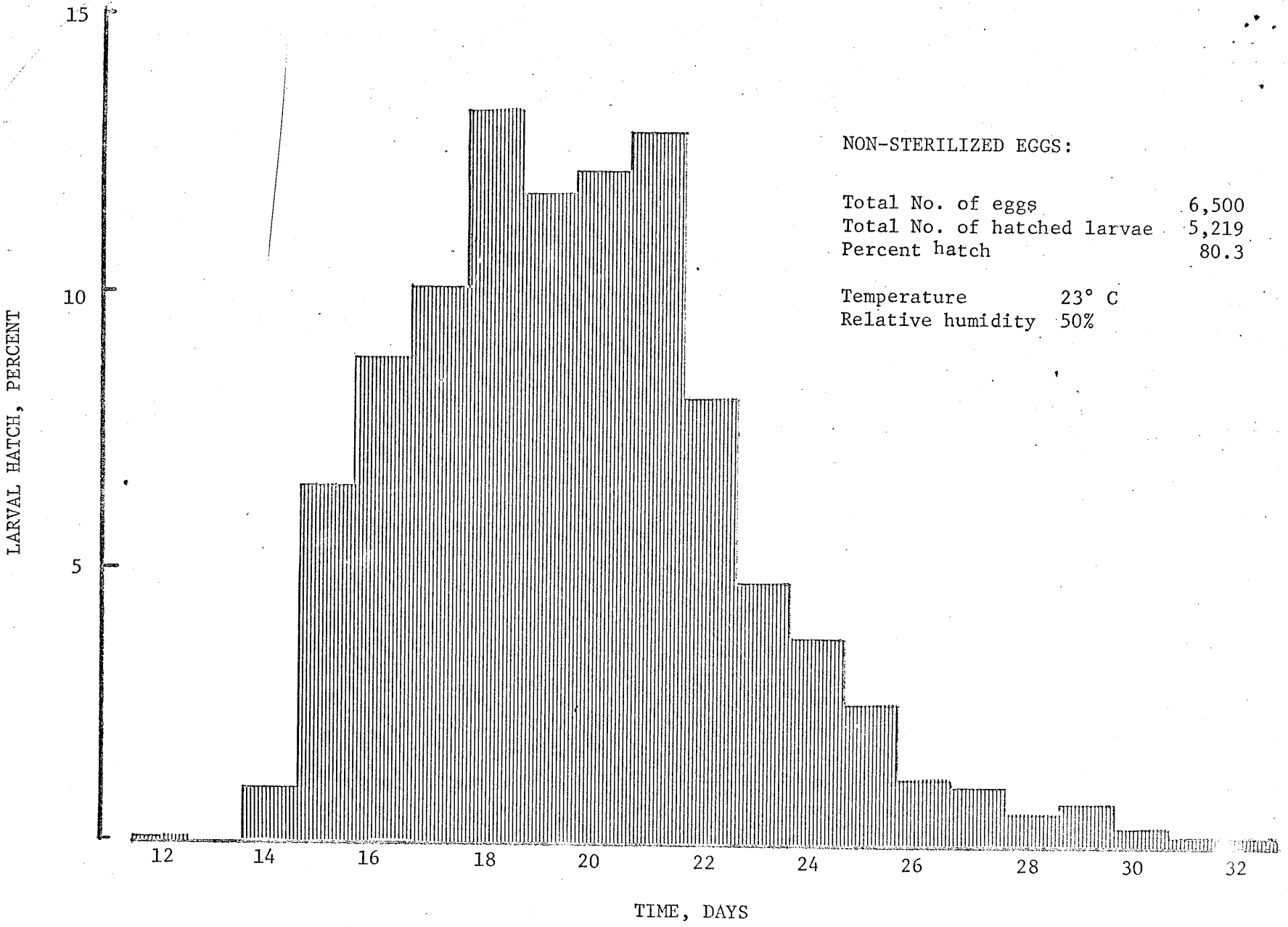

FIG. 2.--Frequency distribution histogram showing percent of larval hatch in days after eggs were exposed for hatching.